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EXAMINER

NGUYEN, HOAN C

ART UNIT PAPER NUMBER

2871

DATE MAILED: 06/30/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/993,503

Applicant(s)

MOON, HOI-SIK

Examiner

HOAN C. NGUYEN

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 February 2005.
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
4a) Of the above claim(s) 1-14 is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 15-24 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

Applicant's election of invention II and species B (claims 15-24) in the reply filed on 02/28/2005 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Response to Amendment

Applicant's arguments with respect to new claims 15-24 based on the Response filed on 08/03/2004 have been considered but are moot in view of the new ground(s) of rejection. Therefore, this is Final action.

Specification

The disclosure is objected to because of the following informalities:

- Equation (1) in page 25 must include an "equal sign".
- In Page 26 line 14, specification discloses "when the conventional printed circuit board is thermo-compressed as shown in Table 7" while Table 7 shows the data of the shrinkage printed circuit board. This is inconsistent.
- From page 28 line 14 to page 29 line 3, a specification discloses "Referring to FIG. 5A, the expansion direction of the first TCP 200a is identical to the expansion direction of the shrinkage printed circuit board 100 (this is not true as Fig. 5B shown). However, the expansion direction of the eight TCP 200h is

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opposite to the expansion direction of the shrinkage printed circuit board 100

(this is not true as Fig. 5C shown)". Fig. 5A does not show this feature.

- There is no assigned interval V1 in Fig. 5B as disclosed in page 29 lines 3-9.
- There is no assigned interval V8 in Fig. 5C as disclosed in page 30 line 10 to page 31 line 4.
- There is no description of the assigned numbers 28, 38, 64 and 82 for Fig. 7A-B.
- Applicants fail to point out the significant differences between the conventional PCB and the shrinkage PCB. The conventional PCB and the shrinkage PCB both have thermal expansion.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 15-24 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

There is nowhere in a specification discloses:

Claim 15:

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- forming a first conductive pattern group on the printed circuit board in accordance with the thermal expansion properties of the printed circuit board such that intervals between ones of the first conductive pattern group are **smaller** than intervals between ones of a corresponding second conductive pattern group provided on the adherent member (TCP).

Claim 19:

- a plurality of printed circuit board land groups formed on the substrate, each one of the printed circuit board land groups corresponding one-to-one with one of the connection ports of the external device, an interval between the printed circuit board land groups being **smaller** than an interval between the connection ports.

Claim 23:

- forming printed circuit board land groups that correspond one-to-one with each of the connection ports of the external device on a substrate such that an interval between the printed circuit board land groups is **smaller** than an interval between the connection ports.

Therefore, these features in claims 15, 19 and 23 consider as New Subject Matter.

In response, applicants admits that the specification describes:

The PCB land group 120 is composed of a plurality of PCB lands 120a to 120h and each PCB land 120a and 120h is shrunk by a predetermined dimension (hereafter, it is called the shrinkage design) in the direction of a point M driving the substrate 110 into two parts along the length of the substrate 110" (Page 16, lines 10-13).

This case, each TCP 220a to 200h is formed by a predetermined interval (between TCP, **not between second conductive pattern group or connection ports**) to align in the position before each PCB 120a to 120h corresponding to the TCP 200a to 200h is shrunk" (page 21, line 14 to page 22, line 2).

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Furthermore, the specification also describes:

In the shrinkage printed circuit board 100 having the above-described construction, the input lead 230 of the TCP 200a through 200h is covered with the ACF 130 of the shrinkage printed circuit board 100 by utilizing a movable stage and a fixing member. At that time, the center of each PCB land 120a through 120h is deviated from the center of each TCP 200a through 200h by the shrinkage amount of each PCB land 120a through 120h, thereby forming a pre-compression state (page 22 lines 6-11).

Also, as will be described below, the thermal expansion amounts of the tape carrier packages can be presumed to have constant values concerning the shrinkage printed circuit board 100 or the conventional printed circuit board during the thermo-compression bonding process (page 26 lines 6-9).

As shown in Table 3, the average value of each thermal expansion amount of each TCP is about 37.3 μm (the standard deviation is 2) when the shrinkage printed circuit board 100 is thermo-compressed. Also, the average value of each thermal expansion amount of each TCP is about 42.17 μm (the standard deviation is 0.988) when the conventional printed circuit board is thermo-compressed as shown in Table 7.

When the pre-compression process is performed concerning the first TCP 200a and the first PCB land 120a, the left end of the first PCB land 120a moves toward a first dotted line 420 due to the thermal expansion of the substrate 100 and the left portion of the first TCP 200a also moves toward the second dotted line 520 for the same reason. Hence, after the thermo-compression bonding process, the first TCP 200a is expanded by an interval ($V1$, **there is not $V1$ in Figure 5B, this should be α**) between the second real line 510 and the second dotted line 520. Also, the first PCB land 120a expands by an interval ($P1$) between the first real line 410 and the first dotted line 420. Then, the measured misalignment value becomes the interval ($A1$) from the second dotted line 520 to the first dotted line 420 (page 28 line 12 to page 29 line 6).

When the pre-compression process is performed concerning the eighth TCP 200h and the eighth PCB land 120h, the left end of the eighth PCB land 120h moves toward the first dotted line 620 due to the thermal expansion of the substrate 100 and the left portion of the eighth TCP 200h also moves toward the second dotted line 720 due to the thermal expansion of the substrate 100. Hence, after the thermo-compression bonding process, the eighth TCP 200h is expanded by an interval ($V8$, **there is not $V8$ in Figure 5C, this should be α**) between the second real line 710 and the second dotted line 720. The eighth PCB land 120h also expands by an interval ($P8$) between the first real line 610 and the first dotted line 620. Also, the measured misalignment value becomes the interval ($A8$) from the second dotted line 720 to the first dotted line 620 (page 30 line 6 to page 31 line 4).

FIGs. 7A and 7B are plane views showing the relative position between the PCB land and the TCP concerning Sample 1 in Table 2 after the thermo-compression bonding process (page 36 lines 8-9).

In Table 2, the misalignment amount is measured on the basis of each edge of TCP 200a through 200h for the convenience of the measurement. However, the precise misalignment amount should be measured on the basis of each PCB land 120a through 120h and the center of each

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lead of TCP 200a through 200h because the misalignment means the irregularity among conductive patterns for exchanging the electrical signals between the printed circuit board and the tape carrier package (there is no feature in claims 15, 19 and 23).

Therefore, after the widths of each PCB land 120a through 120h and each TCP lead 200a through 200h are measured, the calculated misalignment values on the basis of the center of each TCP lead 200a through 200h are presented in Table 7. In the samples of shrinkage printed circuit board, the measured width of each PCB land 120a to 120h and the measured width of each TCP lead 200a to 200h are shown in the following Table 6 (page 49 line 5 to page 50 line 2).

Examiner looks over the specification but this invention is about (1) the relative position between the PCB land and the TCP (NOT "second conductive pattern group or the connection ports provided on TCP"), and (2) the thermal expansion affect on the widths of each PCB land 120a through 120h and each TCP lead 200a through 200h.

Furthermore, both PCB and TCP have thermal expansion; this cannot imply the features cited in claims 15, 19 and 23.

In conclusion, claims 15, 19 and 23 are rejected due to having new subject matter, therefore, claims 16-18, 20-22 and 24 are rejected since they depend on the infinite claims.

In the event that the applicants argue that the above 112, 1st paragraph rejection is inappropriate because the invention is inherent in the disclosure, the following rejections in view of admitted prior art are appropriate:

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 15-16 and 18-23 are rejected under 35 U.S.C. 102(b) as being anticipated by the conventional art admitted by applicants.

The conventional arts (Tables 1, 4-5, 8-9, 11 and Figs. 1, 2 4, 8, 10-11) disclose a method for manufacturing a bonded adherent member and printed circuit board comprising

Claim 15:

- forming a first conductive pattern group on the printed circuit board in accordance with the thermal expansion properties of the printed circuit board such that intervals between ones of the first conductive pattern group are smaller than intervals between ones of a corresponding second conductive pattern group provided on the adherent member;
- thermocompression bonding the adherent member and the printed circuit board;
- during the thermocompression bonding, allowing the printed circuit board to expand such that the first conductive pattern group is substantially aligned with the second conductive pattern group.

wherein

Claim 16:

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- the adherent member is a tape carrier package.

Claim 18:

- the intervals between ones of the first conductive pattern group are asymmetric when the printed circuit board is asymmetric.

The conventional arts (Tables 1, 4-5, 8-9, 11 and Figs. 1, 2 4, 8, 10-11) disclose a printed circuit board that is to be electrically connected to an external device through a plurality of connection ports spaced apart part from each other, the printed circuit board comprising:

Claim 19:

- a substrate; and
- a plurality of printed circuit board land groups formed on the substrate, each one of the printed circuit board land groups corresponding one-to-one with one of the connection ports of the external device, an interval between the printed circuit board land groups being smaller than an interval between the connection ports.

wherein

Claim 20:

- a tape carrier package electrically connects the external device and the printed circuit board.

Claim 21:

- the interval between the printed circuit board land groups becomes substantially same as the interval of the connection ports by thermal expansion when the printed circuit board undergoes a thermo-compression bonding process to create

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an electrical connection between the tape carrier package and the printed circuit board.

Claim 22:

- the intervals between ones of the first conductive pattern group are asymmetric when the printed circuit board is asymmetric.

The conventional arts (Tables 1, 4-5, 8-9, 11 and Figs. 1, 2 4, 8, 10-11) disclose a method of manufacturing a printed circuit board that is to be electrically connected to an external device through a plurality of connection ports spaced apart from each other, comprising:

- forming printed circuit board land groups that correspond one-to-one with each of the connection ports of the external device on a substrate such that an interval between the printed circuit board land groups is smaller than an interval between the connection ports.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

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shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to HOAN C. NGUYEN whose telephone number is (571) 272-2296. The examiner can normally be reached on MONDAY-THURSDAY:8:00AM-4:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Nelms can be reached on (571) 272-1787. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

HOAN C. NGUYEN
Examiner
Art Unit 2871

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ANDREW SCHECHTER
PRIMARY EXAMINER